1959-51 **File No.** 847/48

B CLASS P.W. **DEPARTMENT**

C **BRANCH**

Subject:— Weak Culverts

Strengthening of —

B[K] 1951

File No. 847/48 C Br

Ltd. Scott. Slip. 51 A

Std. Sectt. 73 a.

G.R., G.D., No. 2408, dated 22-6-22.]

Correspondence

DOCKET SHEET

Subject :—

File No. 847/48

P.W. **DEPT.**

C **BRANCH.**

References :—

Copies from original file B[illegible] 1951 are supplied to this Region:

Date.	To whom sent.	Notes and instructions.

Weak Culverts
-Strengthening of-.

GOVERNMENT OF BOMBAY.
Public Works Department.
Circular No. 847/48.
Bombay Castle (Bombay No.1),
1st June 1950.

GOVERNMENT CIRCULAR MEMORANDUM.

It has been suggested that a cement slab over an otherwise weak culvert, unfit for heavy traffic , may enable it to sustain a weight upto fifty tons or more and the road thus can be made safe for heavy loads.

2. The Executive Engineers are requested to report on the feasibility of this suggestion, as an alternative to rebuilding the entire structures or relaying decking where culverts are otherwise requred to be rebuilt or strngthened. If the suggestion is considered feasible and economical, full parti-culars of each case should be reported to Government for orders.

By order of the Governor of Bombay.

Sd/-

Assistant Secretary to Government.

G.C.M.,No. 847/48, P.W.D. , dated the 1st June 1950

To

The Chief Engineer, Public Works Department,

All Superintending Engineers of Circles.

All Executive Engineers of Divisions under the Superintending Engineers.

No. of 1950.

Copy forwarded for information and guidance to.

Letter.

No. Bj-19/1 Executive Engineer's Office,
BIJAPUR: 12th July 1950.

To

The Superintending Engineer,
Southern Circle, Belgaum.

Subject: Weak culverts, strengthening of-
Reference: Your No. DM-19 dated 19-6-50.

A doubt has arisen as to whether the weak culverts mentioned in Government letter are weak arched culverts or ~~xxx~~ weak slab drains. This may please be clarified and also whether the cement slab mentioned is plain cement concrete slab or reinforced cement concrete slab.

Sd/- A. B. Haval,
Executive Engineer, Bijapur Dn.

True copy
Id/-
25/8

No. DM-19 Public Works Department,
Belgaum: 28th August 1950.

To

The Executive Engineer,

B I J A P U R Division.

Subject: Weak Culverts:
Strengthening of ---

Reference: Your No. Bj- 19/1 dated the 12th July 1950.

The "Weak culvert" referred to in G.C.M.(P.W.D.) ~~xxxxx~~ ~~xxx~~ No. 847/48 dated 1st June 1950 refers to culverts which have weak decking and which can be made strong by having cement slab decking.

2. The "Cement slab" referred to in the G.C.M., is R.C.C. slab.

3. You are requested to find out whether there are any such weak culverts which can be strengthened by putting R.C.C. slab. If there are any full particulars of such culverts should be reported to Government for orders, under intimation to this office.

Sd/- 27/8
Superintending Engineer, S.C.
Id/- Id/-
25/8 25/8

Copy together with a copy of the Executive Engineer, Bijapur's letter referred to above forwarded with compliments to the Chief Engineer to Government, Public Works Department for information.

2. It is presumed that the above interpretation is correct. Please confirm.

-.-.-.-.

230

No. DM-19 5 Public Works Department,
Belgaum: 28th August 1950.

To

The Executive Engineer,
Bijapur Division.

Subject:- Weak Culverts:
Strenghtening of----

Reference: Your No. Bj- 19/1 dated the 12th July 1950.

The "Weak culvert" referred to in Government Circular Memorandum (Public Works Department) No. 847/48 dated 1st June 1950 refers to culverts which have weak decking and which can be made strong by having cement slab decking.

2. The "Cement slab" referred to in the Government Circular Memorandum, is R.C.C. slab.

3. You are requested to find out whether there are any such weak culverts whih can be strengthened by putting R.C.C. slab. If there are any full particulars of such culverts should be reported to Government for orders, under intimation to this office.

Sd/-

Superintending Engineer, Southern
Circle,

Copy together with a copy of the Executive Engineer, Bijapur's letter referred to above forwarded with compliments to the Chief Engineer to Government, Public Works Department for information.

2. It is presumed that the above interpretation is correct. Please confirm.

True Copy,

V. G. Phatak,
Junior Assistant, Issue Section,
P. W. D. Secretariat, Bombay.

350

Letter.

No.847-48-C(II)

Public Works Department,
Bombay Castle (Bombay No. 1),
9th October 1950.

To

The Superintending Engineer, Sotuthern Circle.

Subject:- Weak culverts.
strengthening of

Reference: (i) Government Circular Memorandum No. 847-48, dated the 1st June 1950, addressed to all the Superintending Engineers of Cicles and the Executive Engineers of Divisions, and (ii) your endorsement No. D.M.-19, dated the 28th August 1950

2. A culvert generally has no decking, unless it is timber-topped. A weak culvert is one, the arch or the slab (whether R.C.C. or stone) or the timber beams and planks, etc., of which are not strong enough to allow the live load to pass safely. The concrete slab referred to in the Government Circular Memorandum No. 847/48, dated the 1st June 1950, should be assumed to mean the R.C.C. slab.

3. You are requested to submit the information called for in the Government Circular Memorandum referred to above.

By order of the Governor of Bombay,

Sd/- 11/10/50
(J. M. Dave)
Assistant Secretary to the Government of Bombay, Public Works Department.

D.A. Nil.

Copy, with a copy of the Superintending Engineer's endorsement under reply, forwarded to-

all Superintending Engineers of Circles (except the Superintending Engineers, Southern Circle and Gujarat Irrigation Circle),

all Executive Engineers of Divisions under the Superintending Engineers,

for information and guidance.

2. All Executive Engineers (except the Executive Engineer, Irrigation Development and Nasik Irrigation Divisions) are requested to expedite submission of the information called for and in the Government Circular Memorandum dated the 1st June 1950.

Copies forwarded to the Superintending Engineer, Gujarat Irrigation Circle, with reference to his letter No. 999/5541, dated the 25th July 1950, with a request to offer his views on the feasibility of the suggestions made in the Government Circular Memorandum quoted above, in the light of the above interpretation of the 'Weak Culvert' and the "Cement Slab"

No. G.R. -17

Officer of the Executive Engineer, Irrigation Projects Dn,(South), Dharwar, 15th July 1950.

To

The Superintending Engineer,.
Karnatak Irrigation Circle,
Dharwar.

Subject:- Weak culverts -strengthening.of----

Reference:- Government.Circular Memorandum P.W.D. No. 847/48 dated 1-6-1950.

2. I offer the following remarks on the suggestions contained in the G.C.M. mentioned above in regard to strenghthening of weak culverts.

3. A culvert can be said to be weak if any one or more of its main structural parts, namely its (i) foundations, (ii) Superstructure i.e. abutments and piers and (iii) decking are defective and are incapable of withstanding the expected load intensities. If a culverts has weak foundation, no amount of strenghthening of its decking would make the culvert-structure as a whole, sufficiently strong to bear additional load. Similar would be the case with week superstructure. In such cases, the safe remedy lies only in rebuilding the culvert in stronger form. It is therefore enough if the merits of the suggestion in question are examined in regard to culverts having weak decking.

4. A culvert may have any one of the following deck type and each of them will have to be considered separately.

1. Timber topped.
2. Slabbed R.C.C. or stone slabs.
3. Arched- C.C. or R.C.C. arches or masonry arches.

In the following discussion on each type of decking mentioned above, it is assumed that the foundations and superstructure of a culvert are sufficiently strong and that only its decking is weak.

(a) Timber topped decking:- This is only suitable for light traffic conditions, Moreover it is uneconomical to strengthen such deckings and attend to the frequent renewals required, and hence for heavy traffic conditions it would be safer and more economical to replace them by R.C.C. decking.

(b) Stone slabs:- Usually the span does not exceed 5 ft. The slab can be strengthened by adding a C.C. layer on

top or alternatively the load intensity can be reduced by increasing the depth of cushioning. In view of small spans of such culverts, it would be desirable to replace stone slabs by R.C.C. slabs instead of resorting to the above mentioned methods of strengthhenging.

(ii) R.C.C. Slab:- It is feasible to strenghten the decking by adding a layer of C.C. on top of the existing R.C.C. slab, care being taken to create a good bond between the old and new work.

(c) Arched Culverts.

(i)Masonry Arches:- It is feasible to strengthen masonry arches for additional loading by adding a layer of C.C. on top. It is essential to ensure proper bond between the old and new work.

(iii) C.C. or R.C.C. arches:- Same remarks as above.

Sd/- D.B. Kankanawadi,
Executive Engineer,
Irrigation Projects Dn,(South),

True Copy.

Sd/-
21/2.

No

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11

Letter.
No. G.R.17/958

Office of the Executive Engineer,
Irrigation Projects Dn.,(South),
Dharwar: 22nd February, 1951.

Sir.
To

The Assistant Secretary to Government,
Public Works Department, Bombay.

Subject :- Weak Culverts- strengthening of---

Reference:- Government letter P.W.D. No. 847/48-C
dated the 12th February , 1951.

A copy of my remarks on the above mentioned subject, previo-
-usly submitted to the Superintending Engineer, Karnatak
Irrigation Circle, Dharwar, is sent herewith.

Sd/-

Executive Engineer,
Irrigation Projects Dn.(South)

Id/-
21.2

Copy with a copy of the Government letter under reference forwarded with compliments to the Superintending Engineer, Karnatak Irrigation Circle, Dharwar , for information.

No. G.R. 65.

Office of the Executive Engineer,
Ghataprabha Left Bank Canal Dn.,
P. O. Ghataprabha(Dist: Belgaum),
Dated: 23rd January 1951.

To

The Chief Engineer,
P.W.D. BOMBAY.

Subject:- Weak Culverts
-Strengthening of.

Reference:- Govt. P.W.D. Circular No. 847/48
dated 1st June 1950.

The suggestion seems generally feasible for the following reasons:-

(i) In the case of timber decking the structure gets weakened as timber deteriorates due to age. Besides, the loads are not evenly distributed on the piers and abutments but are concentrated at the points of contact. The same applies more or less to stone slabs as the bearing is not always true and perfect. If an R.C.C. slab is laid on such timber decking or old stone slab, the structure is compounded and therefore becomes stronger.

(ii) The above consideration of relaying decking applies to arched tops of culverts also. The side thrust will reduce on account of the slab in the compounded structure and as a result even thinner sections or weaker structures of abutments or piers can be made strong enough to take more load.

It will be necessary to bond the new work with the old securely and further to make sure that the old decking, slab or arch is reasonably strong to transmit the portion of the load taken up by them in the compunded structure. Otherwise complete replacement of old work will become essential.

However each structure requires to be separately examined before such remedy is suggested.

There are no cases of weak culverts in this Division.

Sd/-
Executive Engineer,
Ghataprabha Left Bank Canal
Division.

Copy forwarded with compliments to Deputy Engineer, "A", "B","C",and "D" Sub-Division.

THROUGH:-

The Superintending Engineer,
Karnatak Irrigation Circle,
Dharwar.

forwarded with compliments to the Chief Engineers P.W.D. Bombay

Superintending Engineer
Karnatak Irrigation Circle.

———oOo———

No. G. R. -17

Office of the Executive Engineer,
Irrigation Projects Division, (South),
Dharwar, 15th July 1950.

To

The Superintending Engineer,
Karnatak Irrigation Circle,
Dharwar.

Subject:- Weak culverts -strenthening of---

Reference:- Government Circular Memorandum P.W.D.
No. 847/48 dated 1-6-1950.

2. I offer the following remarks on the suggestions contained in the G.C.M. mentioned above in regard to strengthening of weak culverts.

3. A culvert can be said to be weak if any one or more of its main structural parts, namely its (i) foundations, (ii) superstructure i.e. abutments and piers and (iii) decking are defective and are incapable of withstanding the expected load intensities. If a culvert has weak foundations, no amount of strengthening of its decking would make the culvert structure as a whole, sufficiently strong, to bear additional load. Similar would be the case with weak superstructure. In such cases, thesafe remedy lies only in rebuilding the culvert in stronger form. It is therefore enough if the merits of the suggestion in question are examined in regard to culverts having weak decking.

4. A culvert may have any one of the following deck type and each of them will have to be considered separately.

1. Timber topped.
2. Slabbed R.C.C. or stone slabs.
3. Arched- C.C. or R.C.C. arches or masonry arches.

In the following discussion on each type of decking mentioned above, it is assumed that the foundations and superstructure of a culvert are sufficiently strong and that only its decking is weak.

(a) Timber topped decking:- This is only suitable for light traffic conditions . Moreover it is uneconomical to strengthen such deckings and attend to the frequent renewals required, and.....

and hence for heavy traffic conditions it would be safer and more economical to replace them by R.C.C. decking.

(b) Stone slabs:- Usually the span does not exceed 5 ft. The slab can be strengthened by adding a C.C. layer on top or alternatively the load intensity can be reduced by increasing the depth of cushioning. In view of small spans of such culverts, it would be desirable to replace stone slabs by R.C.C. slabs instead of resorting to the above mentioned methods of strengthening

(ii) R.C.C. Slab:- It is feasible to strengthen the decking by adding a layer of C.C. on top of the existing R.C.C. slab, care being taken to create a good bond between the old and new work.

(c) Arched Culverts.

(i) Masonry arches:- It is feasible to strengthen masonry arches for additional loading by adding a layer of C.C. on top. It is essential to assure proper bond between the old and new work.

(ii) C.C. or R.C.C. Arches:- Same remarks as above.

Sd/- D. B, Kankanwadi.

Executive Engineer,
Irrigation Projects Division.

-.-.-.-.-.-

No. G- 92 Office of the Superintending Engineer,
Karnatak Irrigation Circle,
Dharwar, 17th March 1951.

To

The Chief Engineer to Government,
Public Works Department,
Bombay.

Subject:- Strengthening of Weak culverts.

Reference:- Government P.W.D. Circular No. 847/48- of 1st June 1950 and P.W.D. Letter No. 847/48-C (II) of 9th October 1950.

In enclosing herewith a copy of the Executive Engineer, Irrigation Projects Division (South)'s No. G.R. -17 of 15-7-1950 and Executive Engineer, Ghataprabha Left Bank Canal Divisions's No.G.R. 65 of 23-1-1951, I have to observe as under:-

1.....

1. Where the foundations and /or superstructure are weak it is best to rebuild the whole strcuture.
2. When R.C.C. slab decking or arch is weak it can be strengthened by adding cement concrete or Reinforced Cement concrete above, provided the top layer is firmly bonded to the old work.
3. It is not desirable to add R.C.C. slab on old weak timber decking as the life of the latter is short.

The other Executive Engineers in this Circle have reported that they have notremarks to offer.

There are no cases of weak culverts in this Circle.

Sd/-

Superintending Engineer,
Karnatak Irrigation Circle.

Enclosures
2 letters.

No. Bj. 19.

Executive Engineer's Office,
Bijapur, 10th April, 1951.

To

The Assistant Secretary,
to the Govt. of Bombay P.W.D.

Subject:- Weak culverts strengthening of---

Reference:- G.C. M. 847/48 of 1-6-1950
Your L. No. 847/48-C P.W.D.
of 12-2-1951.

The existing slab drains are not suitable for taking the I.R.C. class A loading . The piers and abutments appear to have been designed as per the old P.W.D. Hand books. In many places the masonry is C.R. III sort and at places even Random rubble. As per G.C. M. P.W.D. No. 4577/36-e of 2-7-42. the abutment and piers as given in the then P.W.D. Hand Books are not considered safe for I.R.C.Class A loading. It would therefore, be necessary to rebuild weak drains and culverts.

Sd/- 9-4-51

Executive Engineer
Bijapur Division.

Id/- 3-4-51.

Copy forwarded with compliments to the Superintending Engineer, Southern Circle, Belgaum with reference to his No. DM-19 of 28-8-50 for information.

Letter

No.847/48-C.

Public Works Department,
Bombay Castle(Bombay No.1),
21st June 1951.

To

The Superintending Engineers of Circles.

Subject:-Strengthening of week culverts.

Reference: Government Circular Memorandum No. 847/48, dated the 1st June 1950.

2. It is considered that no general rule can be laid down, regarding the strengthening of week culverts The Executive Engineers or the Sub Divisional Officers should inspect all masonry works on roads once before the monsoon and once after the monsoon, so that week bridges will come to notice in time. The Chief Engineer Public Works Department finds that this is not being done at present. You are, therefore, requested to inst--ruct all the officers concerned to arrange for such inspections regularly and bring to your notice works, which show signs of weekness and also submit proposals for strengthening them.

3. The information called for in the above referred to Government Circular Memorandum need not be submitted by you if it is pending.

Sd/- 25.6.51

(M. L.Champhekar,)
Chief Engineer,
Public Works Department.

Copy forwarded to all the Executive Engineers of Divisionsunder the Superintending Engineers of Circles.

RPR/-
7/9/56.